for the existence of those bodies, such as inflammatory processes, quiet necrosis of cartilage, etc., have entirely failed to offer a satisfactory solution of the question of their origin.

TUBERCULOSIS OF THE SACRO-ILIAC JOINT.—(CONCLUDED).

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WE must now leave the discussion of the "dry granulating" form of the disease and consider the "moist" or "cold abscess" form. The former exhibits a tendency, as has been seen, toward local limitation; the latter is locally aggressive, tending to infect by successive ruptures of its abscess walls as well as by inherent microbic energy, tissues previously healthy. The first form is under favorable circumstances inclined to recover; the second is equally inclined to terminate fatally. We may therefore expect the treatment to be entirely different.

It is unnecessary here to discuss the constitutional remedies to be adopted in abscess cases, since the question is one rather of medical than surgical therapeutics. For no general treatment has been found that can operate upon local tuberculosis except in an indirect way. But, far from neglecting this branch of treatment, the surgeon will carefully study the constitutional condition of the patient and endeavor to improve it as far as possible.

The local treatment of sacro-iliac tuberculosis with abscess formation now admits, as I believe, of definite formulation, within certain limits. We have seen how successful has been the treatment by rest, systematically applied, in cases which did not present cold abscesses. We then concluded that, if our statistics representing 94.1 per cent. of recoveries were borne out by future records, there would be no reason for undertaking a different plan of treatment. But when abscesses have formed the death rate springs from 5.9 per cent. to 92.1 per

cent. under non-operative treatment. The cause of the large proportion of fatal results is to be sought in secondary infection of distant parts with tubercle bacilli, and in intercurrent diseases, but chiefly in the mixed infection of the tubercular abscesses resulting in sapræmia and often eventually in septicæmia, terminating in death.

The treatment heretofore most widely pursued by the profession has been simply palliative, and it is this policy of "let alone" that has been chiefly responsible for the complications that ushered in the fatal issue. The palliative treatment of the disease is moreover to be arraigned not only for its high death rate, but for the hopeless suffering of the patient as he nears the grave. Permit me to cite an example—by no means extraordinary—from the monograph of Delens, who in turn refers to Larrey. (See case 9, table 1).

"Chalopin, a private in the 47th regiment of the line, entered the service of Baron Larrey at the Military hospital of Val de Grace, March 19, 1851. He was a man of bad constitution, had chronic bronchitis and appeared to be in a state of tubercular cachexia.

"Two years before, he fell in going down a stone staircase and struck upon his right hip. Some pain was noticed on the following days, but he remained on duty. The pain disappeared on resting, but returned at certain periods, chiefly at times when the weather was cold and wet.

"He was several times in the hospital at Nantes when counter-irritation was practiced in the trochanteric region. Acupuncture did no good. At that time there was no swelling or deformity, though the patient could hardly walk.

"On entering Val de Grace they observed the existence of pains over the right sacro-iliac symphysis, the impossibility of standing or walking and a manifest swelling near the trochanter.

"Thirteen days later a cold abscess was opened over the sternum.

"April 4 and the days following moxas were applied at the side of the sacro-iliac joint.

"May 10. The swelling already mentioned in the trochanteric region had become larger and was associated with redness of the skin, tension and an intense febrile reaction.

"May 30. Greater prominence of the tumefaction was noted with

fluctuation and sharp pain over the joint. On the next day the abscess was opened, giving exit to 500 grams of lumpy curdy pus.

"June 2. Reaction has been sharp, the pulse full and frequent, the face suffused, the pus less abundant, and the patient had a sensation of malaise with occasional chilliness.

"June 6. A probe passed easily into the pelvis along the anterior face of the sacrum. The patient lay on the left side. He was relieved by sustaining the pelvis from the right side with several cushions. High fever was presenting, but there was no resorption of pus.

"June 7. A counter-opening made below the first evacuated much grayish lumpy pus and a seton was passed between the two openings. The patient grew worse, suffering from a high fever.

"July 10. An abscess opened at the level of the right sacro-iliac joint when it was noted that there was denudation of the posterior face of the sacrum and ilium, and an abnormal mobility with crepitation between the articular surfaces of these two bones. The signs of purulent infection persisted, and July 29, a little more than four months after admission, the patient died."

Numerous other examples might be adduced to demonstrate the horrors of such a mode of death. But the great mortality of this disease under such therapeutic measures would be alone sufficient to condemn that treatment if another and more promising method were available.

It must, however, be remembered that at least one case has recovered under rest alone, the case of Mr. Hilton, in which a cold abscess healed after spontaneous absorption of its contents; while two cases of Tiling recovered after drainage by no means systematic. These cases are, however, in very small minority, and enable us to draw no conclusions for future work.

In the present state of surgical science palliative treatment by simple drainage must be reserved for cases in which the radical operation is especially contra-indicated, as in cases complicated by mortal disease elsewhere. This conclusion is strongly supported by the statistics of radical operative interference. Thus far two cases have been operated upon by Dr. Sayre with recovery, and two cases each by Tiling and Gant. Tiling's cases died; Gant's recovered. (It is probable that one

of Tiling's cases, however, was not tubercular). The case reported in this article by the writer also recovered. Thus out of seven cases five recovered, a percentage of 71.4. Besides this rather small list of fully recorded cases of operation, Mr. Barwell[1] briefly mentions a case of his in which recovery ensued after operation.

We have seen, in examining the history of the treatment, how averse to operation have been the surgeons of the past. As we have observed Prof. Sayre has been an exception to this rule during the many years of his practice. But many of the older surgeons were dismayed by dangers that do not affect those practising under antiseptic precautions. Hence, for us, only the opinions of recent writers are valuable. Mr. Barwell has, in his article in the International Encyclopædia of Surgery, discussed the propriety of operation. He counsels a sufficiently early drainage of abscesses, and, in case the disease has not extended too far, removal of the morbid material. But, if there is implication of the front of the sacrum, the treatment will depend upon the condition of the patient. In much debilitated patients no operation should be performed; but if the patient is more robust he strongly advises "perforation along the sinus track and drainage."

Mr. Heath,[2] writing in 1876, considers operative interference a very serious matter.

The experience of Gant, with his two successful operations, is certainly on the side of surgical interference.

G. Tiling[3] states that treatment will depend partly on what part of the bone is affected. He continues:

"Since we cannot in the near future hope to be able to accurately locate diagnostically the primary foci of tubercular disease in these bones so as to remove them, our treatment must be in the beginning a more expectant one. In perforation into the rectum and bladder, the therapy is quite defective; in those opening at the anus they must be limited to the necessary disinfection. If the pus break through along the

[1]See article on "Joint Diseases," International Encyclopæ!ia of Surgery.

[2]British Medical Journal, 1876. Vol. II, p. 781.

[3]St. Pe!ers urger Medicinische Wochenschrift, July 3, 1883.

path of the iliacus or above Poupart's ligament, one might still think of rational radical treatment since one may try to reach the diseased bone with the sharp spoon. But the result will be for the most part *nil.* The spoon cannot act well at such a distance through a small opening.

"The best field for operation is when pus breaks out directly. [That is when extra-pelvic abscesses point just posterior to the joint.] Here both hand and eye can act together. The prospect is then not brilliant, the often extensive cavities in the soft parts and bones being very unfavorable. A prima intentio is inconceivable; the neighborhood of rectum, anus and urethra places a heavy test upon the carrying out of antisepsis for weeks and months. Hence resection cannot be undertaken for insignificant cases."

One objection here raised to operative interference is on account of the uncertainty of operations conducted along the tracks of old sinuses. I believe the objection is well taken. As will be seen later the indication of intra-pelvic abscess is met by a procedure, suggested by the writer which will obviate the difficulties encountered in operating through sinuses.

That resection (that is, atypical resection) cannot be undertaken for insignificant cases is self-evident. But the writer believes he has demonstrated that cases which cease to belong to the class of non-abscess cases are no longer insignificant but are exceedingly grave and therefore demand operation.

The anatomical objections to operative interference are less formidable than might at first appear. The sacrum and ilium are in no way immediately associated with the vital functions and large parts of them may be removed by the chisel with impunity. The fact that the pelvic girdle may require lessening in extent is chiefly important in child-bearing women. But the dangers encountered in the course of the disease would amply justify operation, even with the risk of subsequent dystocia. The pelvis usually regains its integrity by bony anchylosis. The neighboring soft parts are in no danger of injury from the operation if ordinary care is taken in its performance. The danger of bringing about mixed infection by operating is, as Tiling has pointed out, very great indeed. But mixed infection of cold abscesses has eventually occurred in

every case with which I am acquainted except that one of Mr. Hilton's which resulted in recovery after absorption of the fluid. Hence we must argue that the very free drainage used by the surgeon gives the patient a much better opportunity to resist secondary microbic invasion than when infection has occurred in the closed cavity. Moreover, the strict application of antiseptic principles will insure in a portion of the cases where operation is undertaken in abscess-cases hitherto entirely tubercular, at least a certain period of asepsis till the granulations have sprung up in sufficient array to render septic absorption in the presence of good drainage a matter of comparatively slight danger.

I believe then that operative interference should be resorted to in every case of sacro-iliac tuberculosis that exhibits unmistakable signs of abscess formation. If, then, operation is thus decided to be imperative it needs but little argument to prove that it should be resorted to in every case as early as practicable after the determining indication, the formation of the abscess, has presented itself. For if the operation is not immediately performed opportunity is afforded for the further extension of the disease by infection from immediate continuity of tissue and by rupture of the cold abscess wall, allowing infection to take place in hitherto healthy tissue. Moreover, should mixed infection occur, symptoms of septic intoxication are added and suppurative osteomyelitis renders the case very grave. Such a misfortune also renders operative interference less hopeful on account of the weakened condition of the patient.

Abscess formation having occurred and radical operation having been decided upon I conceive that the mode of operation will depend entirely upon the seat of the original focus and the direction which the disease process has pursued. Tiling has well averred that we cannot accurately locate in every case the original focus of the disease. One symptom, however, will determine its position with sufficient accuracy for clinical purposes, namely, the position of the abscess. Under the head of Pathological Anatomy we discussed the direction taken by abscesses arising in the sacro-iliac joint. It was seen that, owing to the anatomy of the part, the abscesses occurring in

connection with that joint must pass either anteriorly or posteriorly, that is, they must arise either within the pelvis or without the pelvis, so that all of these abscesses are either intra-pelvic or extra-pelvic. Clinically, as we have seen, it is occasionally somewhat difficult to determine the class to which a given abscess belongs. But it is probable that close attention to the details cited above will determine the point. Now, in accordance with the law that local diseases, like other natural forces, tend to advance in the line of least resistance, we argue that, if an extra-pelvic abscess is present, the morbid material, having escaped from the posterior part of the joint, the principal focus of disease must have been near enough to the great posterior ligaments to weaken them and thus allow the passage of the tubercular detritus in that direction. The same argument applies with reference to the anterior part of the joint when the abscess is intra-pelvic. Nor is the reasoning vitiated whether the disease originated in the bone or within the joint cavity itself, since in either instance the important joint structures are sooner or later involved. Hence when the abscess is intra-pelvic we conclude, at least hypothetically, that the disease is most advanced at the anterior part of the joint; and when the abscess is extra-pelvic, that the morbid process is most advanced at the posterior part.

We are then confronted with the problem of reaching the diseased material in these situations with the maximum economy of healthy tissue and with the greatest assurance of being able to remove the morbid matter when it is reached.

Tiling has well said, as we have seen, that the most favorable cases for operation are those in which the posterior part of the joint is affected. When the presence of an extra-pelvic abscess indicates this more fortunate location of the disease-focus, the operation demanded is simple in nature.

If the abscess is not already opened this should now be done (under strict antiseptic precautions) and, its walls having been scraped to remove tubercular matter, the opening leading to the joint cavity should be found and sufficiently enlarged to admit of ready access for the finger and for such instruments as may be needed. If, as may occur, the disease is neither extensive nor very deeply seated it may be unnecessary to re-

move any healthy bone, so that a free use of the bone gouge and curette suffice. If bone tissue has to be removed to afford greater space for work it is best taken from the ilium, since access to the joint cavity is thus much more easily attained than when a part of the sacrum is chiseled away. Further than this, general rules cannot be laid down since almost every case presents special anatomical peculiarities. One rule should be regarded as imperative—to remove, if possible, all of the tubercular matter. Drainage should be effected by means of iodoform gauze. The following case of Prof. Sayre will illustrate the method perfectly:

No. 46. I. T. L., æt. twenty-three, Westfield, Massachusetts. Came to me Feb. 14th, 1863, with sacro-iliac disease on the right side, with extensive abscess on the posterior crest of the ilium. Right limb half an inch longer than the left, from actual dropping of the ilium. Had the peculiar curvature of the spine of sacro-iliac trouble. Had fallen from a horse four years before and had been troubled ever since, having been treated the two years previous for hip-disease, then sent to me for that trouble. I found no disease of hip joint; but opening the abscess on the sacro-iliac junction gave free exit to a large amount of pus and revealed caries of ilium and sacrum. The dead bone was all gouged away; the wound was dressed with Peruvian balsam and oakum and an extension applied in bed. Afterwards a high-heel was used on well side and crutches were supplied during the day. Recovery was perfect in about fourteen months."

The two cases of F. J. Gant (see table) were examples of cases exhibiting extra-pelvic abscesses. Operation was equally successful. But it must not be supposed that so favorable a termination is always to be expected, since often there is not only an extra-pelvic but also an intra-pelvic abscess, so that the disease is very extensive and requires a correspondingly extensive operation. It is probable that rectal palpation would have enabled the operator in the following case to recognize the intra-pelvic abscess; bnt the treatment would not have been much affected by such additional knowledge. The case is the fourth of Tiling's.[1]

CASE 18.—Boy, æt. 14, previously healthy, entered his care on Jan. 8. Four months before, small swelling was noticed on left buttock. It has increased rapidly since Christmas and now is a colossal

[1]St. Petersburger Medicinische Wochenschrift, July 23, 1883.

abscess under the gluteal muscles. The hip is freely movable. Jan. 9, free incision. Enormous quantity of pus came from below the gluteal muscles and out of the foramen ischiadicum majus. The tuberosity of the ilium, the upper border of the foramen ischiadicum majus and the border of the os sacrum were carious. The tuberosity of the ilium was almost entirely chiseled away, so that the facies auricularis ossis sacri lay completely exposed to the eye. Besides the posterior half of the upper border of the great sciatic notch was removed and, since the finger could not yet press freely into the pelvis, the edge of the os sacrum was removed.

"It was now observed that in the hollow of the sacrum was a mighty pus cavity extending to the right s.i.j., the bones in that direction being covered with periosteum. In the cavity of the sacrum the bone was widely laid bare. The whole os ilium sinistrum was now quite movable about an axis passing through both its symphyses but above and internally was retained in the position by the ligamenta ilio-lumbalia and ilio-sacralia anteriora, since a small part of the anterior and upper border of the facies auricularis ossis ilii was left behind. The bone was removed to this extent because it was so far diseased throughout. Several heavy drains were passed into the pelvis, the wound irrigated and dressed." Pus had no bad odor. Temperature at first fell but frequently rose and under profuse suppuration the patient's strength failed; the pus cavity diminished much in size, but even after six weeks retained considerable size and discharged healthy pus. An ominous diarrhœa now set in which led to death eight weeks after the operation.

"Autopsy, acute tuberculosis of both lungs—superficial caries of the anterior surface of the sacrum, of the fifth and fourth lumbar vertebræ and of the left lateral surface of the sacrum. Right sacro-iliac joint sound. Left half of pelvis of course much smaller than the right since the shortened os ilium sin. was sunken upon the sacrum."

The second case operated upon by Tiling was subjected to a procedure very similar to that undertaken in the case just quoted, was equally severe in character and was equally unfortunate in result. The clinical history of the case, however, is rather that of implication of the joint from osteomyelitis, the disease affecting a number of different joints simultaneously.

But when the anterior part of the joint is chiefly involved, as denoted by the presence of intra-pelvic abscesses alone, and

especially when, from the consensus of symptoms, the surgeon has reason to believe that the anterior face of the sacrum is not diseased to a very great extent, we are compelled to seek operative measures by which, if possible, the disease may be reached without the extensive removal of healthy bone required in the cases operated upon by Tiling.

A systematic procedure has been devised by the writer based upon the following case in which the operative interference was successful.

CASE 59.—Harry D., an unmarried man of 32 years of age, entered Cook County Hospital, Chicago, on Jan. 3, 1887. His family history was good. His own history included gonorrhea, and probably syphilis. He had had occasional hæmoptyses for about fifteen years until one year before admission. In the early weeks of 1886, one year before he entered the hospital, the patient began to suffer from a disease of the spinal cord, diagnosticated after he came to the hospital, by Prof. Walter Hay, of Chicago Medical College, as polio-myelitis anterior atrophica. By October of the same year he had already passed through the worst stage of the disease and had, he said, begun to improve, when one morning in bed he was suddenly seized with a pain in the "lumbar region."

A few days afterwards a tumefaction appeared which gradually increased in size, till in November a pint of pus was removed from it by aspiration. When examined, on admission to the hospital a fluctuant swelling was detected in the right iliac fossa, and another and larger one above the posterior part of the crest of the ilium, extending upward to the twelfth rib, and from the spines of the lumbar vertebræ to the right for a distance of about four inches. The patient had not been able to walk since July on account of his nervous affection, and since that disease had impaired sensation also in the lower extremities, the location of the primary focus was by no means readily diagnosticated. The patient lay on the left side with the thighs moderately flexed.

January 23, 1887, the writer, then house surgeon to the hospital, operated on the case under the direction of Dr. Christian Fenger. The posterior abscess was first opened and, its walls having been thoroughly scraped, the probe was used to find the primary tubercular focus. The probe readily passed downward and forward to the anterior part of the sacro-iliac joint. It was then evident that the two ab-

scesses had a common origin in that articulation. To reach the disease-focus a part of the posterior superior spine of the ilium was removed by the chisel so that the finger easily passed into the pelvis major and guided the bone instruments to the focus of the disease. The anterior ligaments had been chiefly destroyed by tuberculosis, so that

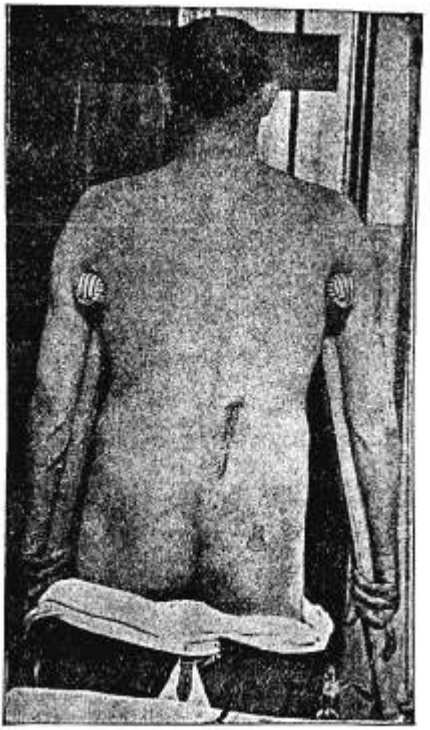

FIG. 2. HARRY D. SHOWING LINE OF INCISION FOR OPENING THE LUMBAR ABSCESS AND OPERATING ON THE SACRO-ILIAC JOINT.

detritus was readily removed and the joint cavity cleared. Iodoform gauze was used as a drain. The abscess in the iliac fossa was now opened and drained with a rubber tube, and a huge antiseptic dressing applied. For the first few days the discharge was very profuse, but after a couple of weeks improvement was very rapid, so that in about

four months from the time of operation the patient was well, so far as his sacro-iliac disease was concerned.[1]

This is the only case of recovery, so far as I can ascertain, after operative interference in intra-pelvic abscess case; indeed but one other case of this kind has ever recovered, that of Hilton, already referred to, in which the abscess detritus was spontaneously removed under the influence of complete rest.

The systematic operation may be performed as follows: The patient lying on the unaffected side with the thighs in exaggerated flexion on the pelvis, the site of operation will be brought into the greatest prominence possible. An incision two or three inches in length will expose to view the posterior superior spinous process of the ilium which should be freed from periosteum and tendinous connective tissue by scraping with a dull instrument. A chisel about one inch in breadth is then used to remove successive small fragments from the exposed bone, always holding the chisel edge parallel to the spinous processes, till the finger can enter the cavity of the pelvis major and palpate the anterior surface of the diseased joint. With curved bone instruments the detritus can now be removed and the wound be packed with iodoform gauze. It will thus be seen that, in cases to which the method is adapted, according to the indications laid down, the operation can be performed without doing any damage to vital structures, or even to important parts of the locomotor apparatus.

In cases which, like those operated upon by Tiling, exhibit extensive implication of the tuberosity of the ilium, extensive removal of the osseous structures is much preferable to slow death from tuberculosis or septic infection. But of such cases each must be a law unto itself as regards the portion of bone to be removed. One rule, however, should be observed in all cases—to leave no tubercular matter that it is possible to remove.

The after treatment of operation cases should include, besides the obvious employment of strict antiseptic principles,

[1]This patient is now, October, 1888, able to walk a little, having to that extent recovered from his nervous lesion.

the use of the weight and pulley extension, and when the patient can move about, the high-heeled shoe on the sound side with crutches so as to afford rest to the joint. The broad pelvic belt seems to me especially important where the joint has been completely penetrated, or where the tuberosity of the ilium has been removed.

Conclusions on Treatment.

1. Sacro-iliac disease is not directly amenable to treatment by drugs. They should, nevertheless, be employed by the surgeon in all forms of the disease when they are likely to improve the general condition of the patient.

2. Counter-irritation is indicated when there is pain, lameness or tumefaction at the joint without abscess formation. The actual cautery seems to be the most effective form.

3. Mechanical rest, which is here also physiological rest, is the treatment par excellence where no abscesses are present.

4. When abscesses have formed radical operative interference must be immediately resorted to.

5. If the abscesses are extra-pelvic they should be operated upon by direct incision and évidement.

6. When the abscesses are intra-pelvic the operator should approach the disease focus, supposedly in the anterior of the joint, by an opening made above the joint proper as described.

7. When both extra- and intra-pelvic abscesses are present the external abscess should be first opened, and the opening between the two, if possible, so enlarged as to admit of radical treatment of the deeper focus of disease.

8. Radical operations cannot be made through long sinuses.

9. Drainage alone is not likely to be successful.

10. After-treatment should include besides antisepsis, continual rest, aided when necessary by the extension and pelvic belt.

11. When radical operation is undertaken no tubercular matter should be left behind.

BIBLIOGRAPHY.

A.—References Collected by Delens.

Louis.—De l'ecartement des os du bassin. Mem. de l'Acad. de chirurg. T. X. ed. Didot.

Enaux.—Noveaux Mem. de l'Acad. de Dijon. III., p. 152; 1784.

Thomassin.—Journal de Medicine Militaire; 1788.

L'Heritier.—Journal de Fourcoy. T. IV, 236; 1792.

Rust.—Arthrokakologie. Vienne, 1817.

Boyer.—Traite des Maladies chir. IV, 139; 1821.

Velpeau.—Archives gen. de Medicine; 1824. T. VI., p. 220. Recherches et observations sur la phlegmasia alba dolens.

Brodie.—Pathological and surgical observations on diseases of the joints. London, 1828.

Larrey.—Clinique chirurgicale, 1829. T. 3, p. 330.

Hayn.—Medicinische Zeitung. Berlin, 1852; and Journal des connaissance medico-chirurgical. T. II, p. 121.

Langier.—Dict. en 30 vol. T. V., p. 88, 1833.

Hahn.—Ueber die sacro-coxalgie. Stuttgart, 1833; and Algemeine medicinische central Zeitung, analyse par le Dr. Chambeyron. (Archiv. gene. de medicine, April, 1834.)

Chr. Pfeufer.—Gazette Medicale, p. 328; 1834.

Frere.—These de Paris, 1838.

Nichet.—Gazette Medicale, 1840, Obs. XV.

Girauld de Nolhac.—These de Paris, 1842.

Joyeux.—These de Strasbourg, 1842.

Maisonneuve.—De la coxalgie. These de l'aggregation, 1844.

Lenoir.—Memoire lu a l'Acad. de Med., le Ier Avril, 1851. (Sur les articulations du bassin.)

Verneuil.—Bulletin de la soc. anat., 1851, p. 219.

Hattute.—These de Paris, 1852. De l' arthropathic sacro-iliaque.

Crocq.—Traite des tumeurs blanches, Bruxelles, 1853, p. 451.

Gurlt.—Beitraege zur vergleichenden pathologischen Anatomie der Gelenk Krankheiten, 1853.

Duncan.—Edinburgh Med. Jour., 1854, p. 112, et p. 201. On the sacrum considered as part of the vault of the pelvis.

Lushcka.—Virchow's archiv fur path. Anat., 1854, dié Kreutzdarmbeinfuge des Menschen, p. 299.

Morel-Lavallee.—Bulletin de la Societe de Chirurgie, 18 mars. 1857.

Rollet.—Gazette med. de Lyon, 1858.

Gueniot.—Bulletin de la soc. Anat., 1858, p. 221.

Erichsen.—The Lancet, 1859; I. p. 25. A lecture on the sacro-iliac disease.

Chassaignac.—Traite de la Suppuration, p. 206.

Barwell.—A treatise on diseases of the joints. London, 1061, p. 363.

Maisonneuve.—Clinique chirurgical, I, p. 347.

L. Labbe.—De la Coxalgie, These d'aggregation, 1863.

Hulke.—Trans. of the Pathol. Soc. of London; XIV, 1863, p. 208.

Verneuil.—Bulletin de la Soc. de Chir. Nov. et Dec., 1865.

Martin et Collineau.—De la Coxalgie, Paris, 1865, p. 400.

COURTY.—Dict. Encycl. des Sc. Med. Article Bassin.
HAMILTON.—Caries of the sacro-iliac joints. N. Y. Medical Record, II, No. 28.
DOLBEAU.—Clinique Chirurgicale, 1867, p. 390.
A. NELATON.—Pathologie Chirurgicale, second edition, II, p. 310.
GOSSELIN.—Gaz. des Hop., 1868, p. 574, et 1870, p. 597.
S. DUPLAY.—Traite de Path., III. p. 93, 1868.
LUSCHKA.—Praktische Anatomie des Menschen, II. bd., 2 Abth.
HOLMES.—System of Surgery, second edition. Disease of the sacro-iliac joints, by A. Johnstone; Vol. iv, p. 88.
EMMERT.—Lehrbuch der speciellen Chirurgie, 1871; 2 bd., p. 192.
BOISSARIE.—De la sacro-coxagie. These de Paris, 1862.
VELPEAU.—Gaz. des Hop., 1862, p. 105.
GOSSELIN.—Gaz. des Hop., 1868, p. 574.

B.—REFERENCES ADDED BY C. T. POORE.

HILTON.—Rest and Pain.
MORRIS.—Med. Times and Gazette, 1873, Vol. II., p. 354.
MASON.—Med. Rec., 1875, p. 860.
BAKER,—St. Barth. Hosp. Reports, Vol. 3, p. 120.
C. HEATH.—Brit. Med. Jour., 1876, Vol. II, p. 781.
FAGAN.—Lancet, 1875, Vol. II, p. 49.
MASTIN.—Trans. Path. Soc. of Phil., Vol. III, p. 139.
KING.—Am. Jour. Obt., Vol. IV, p. 402.
EBELL.—Zeitschr. fur. Geburtsh, Vol. I, 1876, p. 619, Berl. Klin. Woch. Sept. 27 1875.
FRUITNIGHT.—A. J. Obst., Vol. IX, p. 635.
FOLLIN.—Path. Exter., Vol. III, p. 98.
HAKES.—Med. Times and Gaz., 1862, Vol. I, p. 412.
SAYRE.—Orth. Surg, p 132.
JEWETT.—Maine Med. Assoc. Rep., 1869-70, p. 128.
MARTIN, M. F.—Bulletin de Therapeutique, Vol. XL, p. 108, puerp.
PERTEGAT.—Bull. de Th. Vol. 645, p. 323, puerp.
DEHOUT.— " " 64, p. 20.
COUROT.— " " 64, p. 37.
STOLTZ.— " " 64, p. 354.
JACQUIER.— " " 55, p. 121.
ERICHSEN.—Surg. Phil., 1873, Vol. II, p. 276.
BRUGH.—These de Paris, 1877.
SATTERTHWAITE.—Med. Rec, May 26, 1877, p. 329.
M. LEDENTU.—Bull. Mem. Soc. de Chir., Paris, T. III, No. 2, 1877.

C. REFERENCES ADDED BY THE WRITER.

BOUNAIX, A.—Contribution a l étude de la Sacro-coxalgie. These, Paris, 1874.
PERKINS.—(Under the care of Walton) Suppuration in the left sacro-iliac joint from external injury. Death; remarks. Medical Press and Circular, Oct. 20, 1874.
FAGAN, J.—Interesting case of injury of the sacro-iliac joint occurring in a child 4 years old. Lancet, July 10, 1874.

POORE, C. T.—Diseases of the sacro-iliac sychondrosis. Am. Jour. Med. Sciences, Jan., 1878.

SAYRE, L. A.—Sacro-iliac disease and its differential diagnosis from morbus coxarius and spondylitis. N. Y. Med. Record, Feb. 15, p. 145, 1879.

WOOD, JOHN.—Remarks on the employment of double extension in cases of disease and injuries of the spine and pelvic joint. Brit. Med. Jour., June 5, 1880.

TILING, G.—On sacro-iliac disease. St. Petersburger Medic. Woch. No. 29, 1883.

HENLE —Anatomie des Menschen.

QUAIN.—Elements of Anatomy, 1882, p. 167.

MORRIS, HENRY.—The Anatomy of the Joints of Man. Phil., 1879.

HEATH, CHRISTOPHER.—Brit. Med. Jour., Vol. 2, p. 781.

GANT, F.—London Lancet, September, 1887.

KOENIG.—Die Tuberculose der Knochen und Gelenke.

MUELLER, W.—Deutsche Zeitschrift fur Chirurgie, Vol. 25, p. 37-81, 1887.

SCHUELLER, MAX,—Die Pathologie und Therapie der Gelenk-entzundungen, Wien, 1887.

SCHMALFUSS, CONSTATIN.—V. Langenbeck's Archiv., Bd. 35, Seite, 181.

BARWELL.—Article on Joint Diseases, International Encyclopedia of Surgery.

ZIEGLER.—Pathologische Anatomie. Jena, 1887.

MARTIN.—Berliner Klinische Wochenschrift, Sept. 27, 1875.

BIRD, F. D.—Sacro-iliac disease. Australian Medical Journal, June 15, 1887, p. 253.